FOREST MANAGEMENT
DEMONSTRATION NOTE NO. 12

Spacing Effects 20 Years After Planting Three Conifer Species In Manitoba

A spacing study of three native conifers, jack pine, red pine and white spruce was conducted in 1963 in southeastern Manitoba and has been remeasured at five-year intervals since (Bella, 1986). The study area is located at Vassar (Fig. 1), on flat, sandy, nutritionally poor soils with a fresh moisture regime and is in the Rainy River Section (L. 12) of the Great Lakes – St. Lawrence Forest Region (Rowe 1972). The planting site was an abandoned field with grasses and low shrubs. Furrows were ploughed to prepare the ground for planting.

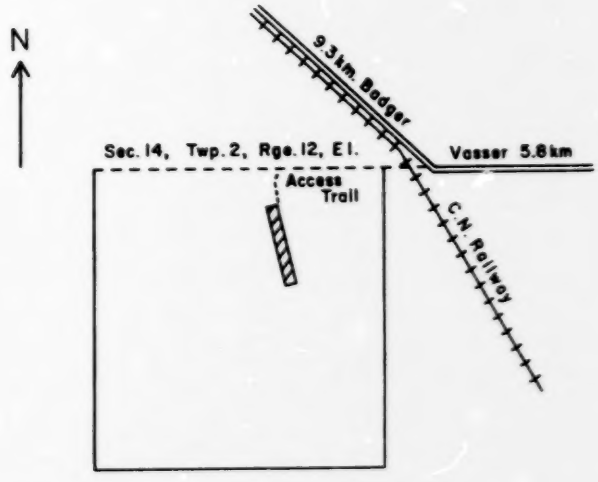

Figure 1. Location of spacing trials.

Three year-old stock was planted in May 1963 using the slit method at square spacings of 1.2, 1.8, 2.4 and 3.0 m in plots of 11 x 11 trees. Each spacing was replicated four times per species (Fig. 2).

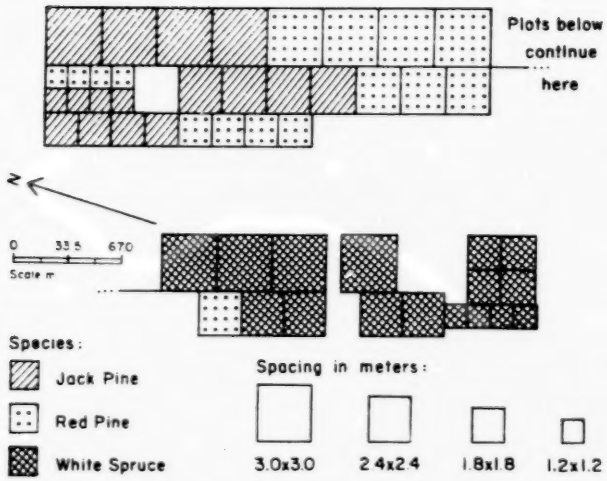

Figure 2. Species and spacing within plots.

By 1983, red pine had the largest average dbh in terms of both the total stand (11.8 cm) and the 250 largest trees ha. Jack pine fell behind red pine by about 15% (10.2 cm). White spruce had dbh growth of less than half of that of the pines.

For the two pines, average dbh increased by 60-80% as spacing increased from 1.2 to 2.4 m. No further improvement occurred at the 3.0 - m spacing. Similar trends emerged for average dbh of the 250 largest trees/ha., although the differences associated with spacing were only about 40%. As of 1983, dbh growth of spruce has shown no consistent relationship with spacing.

Jack pine reached the best average height (7.8 m), followed by red pine (7.2 m) and white spruce (2.2 m). During the period 1979-1983, red pine has slightly outgrown jack pine. Spacing had no consistent effect on height growth, although the best growth occurred at intermediate spacings and jack pine had a significant reduction of growth at the widest spacing.

Total stand volumes for the two pines – considering only trees that had a full complement of living neighbors – were generally highest at the closest spacings. Merchantable volumes, however, were highest at the two intermediate spacings, as were total volumes of all living trees in the inner plots of 7 x 7 trees. White spruce had negligible volumes at 20 years.

Crown width showed a gradual increase with spacing increases for all three conifers. The increase in crown width of jack pine was more pronounced and quite dramatic for large trees (above 12 cm dbh) at the widest spacing. These trees had heavy branches and greater taper.

These results suggest an optimum spacing of between 1.8 and 2.4 m for both pines in order to achieve rapid tree growth and high future timber yields. Unlike jack pine, red pine retains good tree form even at wide spacing. Both species have shown rapid growth, but it is too early to say with any confidence which species is performing better. Spruce grew at less than half the rate of the pines in the first 20 years after planting; therefore, spruce is not recommended for planting on similar sites.

References:

Bella, I.E. 1986. Spacing effects 20 years after planting three conifers in Manitoba. Can. For. Serv., North. For. Cent., Edmonton, Alberta. For. Manage. Note 39.

Rowe, J.S. 1972. Forest regions of Canada. Environ. Can., Can. For. Serv., Ottawa, Ontario. Publ. 1300.

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